



MICHIGAN DEPARTMENT OF NATURAL RESOURCES
Wildlife Division Report No. 3543
June 2012

Printed by Authority of: P.A. 451 of 1994
Total Number of Copies Printed:25
Cost per Copy:.....\$1.75
Total Cost:\$43.75

Michigan Department of Natural Resources

2008 WATERFOWL HARVEST SURVEY

Brian J. Frawley

ABSTRACT

A sample of waterfowl hunters was contacted after the 2008 hunting seasons to estimate hunting activity and determine opinions and satisfaction with hunting regulations. Waterfowl hunting license sales declined 1% between 2007 and 2008; however, the number of people hunting ducks and geese was not significantly different between 2007 and 2008. In 2008, about 47,384 people hunted waterfowl in Michigan (nearly 40,405 duck hunters and 34,292 goose hunters). Satisfaction with waterfowl numbers, hunting experience, and hunting season dates among duck and goose hunters was similar between 2007 and 2008. An estimated 15,356 hunters hunted diving ducks, and 2,755 youth hunters (10-15 years old) participated during the 2-day youth waterfowl hunting season. Duck hunters were asked to indicate their preferred opening date for the 2009 duck hunting season (i.e., September 26, October 3, or October 10); however, none of the options were favored by most of the duck hunters.

INTRODUCTION

The Michigan Natural Resources Commission and Department of Natural Resources (DNR) have authority and responsibility to protect and manage wildlife resources in the state of Michigan. This responsibility is shared with the U.S. Fish and Wildlife Service (USFWS) and other state and provincial wildlife management agencies for the management of migratory birds such as ducks (Anatinae) and geese (*Branta* and *Anser* spp.). Harvest surveys are one of the management tools used by the Wildlife Division in developing regulations. Estimating harvest and hunting effort are among the primary objectives of these surveys. Estimates derived from harvest surveys, as well as breeding bird abundance and population models, are used to develop harvest regulations that provide sustainable recreational hunting and



A contribution of Federal Aid in Wildlife Restoration, Michigan Project W-147-R

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viewing opportunities of migratory game birds. Wildlife management agencies also consider hunter opinions and desires when establishing regulations.

Waterfowl could be harvested during hunting seasons that occurred September 1, 2008, through February 1, 2009, (Table 1) by a person possessing both a waterfowl and a small game hunting license (includes resident, nonresident, 3-day nonresident, resident junior, and senior small game hunting licenses). Waterfowl hunters also had to obtain a federal waterfowl stamp and register with the National Migratory Bird Harvest Information Program (HIP). Hunters younger than 16 years of age could hunt waterfowl without a waterfowl hunting license or a federal waterfowl stamp; however, they still were required to purchase a small game license and register with the HIP.

The HIP is a cooperative effort between state wildlife agencies and the USFWS. It was implemented to improve knowledge about harvest of migratory game birds (e.g., ducks, geese, and woodcock [*Scolopax minor*]). Beginning in 1995, any person who hunted migratory game birds in Michigan was required to register with the HIP and answer several questions about their hunting experience during the previous year. The HIP provided the USFWS with a national registry of migratory bird hunters from which they can select participants for Federal harvest surveys.

State wildlife agencies select specific regulations, such as hunting season dates, within overall frameworks (e.g., number of days of hunting and bag limits) set by the USFWS. Both waterfowl population status and hunter attitudes are used when developing Michigan waterfowl hunting regulations. Although estimating harvest, hunter numbers, and hunting effort were the primary objectives of the waterfowl harvest survey, this survey also provided an opportunity to collect information about management issues. Questions were added to the questionnaire to estimate hunters' opinions and satisfaction with hunting regulations and waterfowl numbers.

METHODS

The Wildlife Division provided all waterfowl hunters the option to report information voluntarily about their hunting activity via the internet. This option was advertised on the DNR website and an e-mail message was sent to waterfowl hunting license buyers that had provided an email address to the DNR. Hunters reported whether they hunted, locations hunted (county and management zone), type of land on which hunt occurred (public or private lands), number of days spent afield, and number of waterfowl harvested. Hunters were also asked to rate their overall hunting experience and indicate satisfaction with hunting regulations (e.g., season dates and bag limits). Following the 2008 hunting seasons, a questionnaire (Appendix A) was sent to 5,984 randomly selected people who were eligible to hunt waterfowl and had not already voluntarily reported harvest information via the internet. Hunters receiving the questionnaire in the mail were asked the same questions as hunters responding on the internet.

Estimates were calculated using a stratified random sampling design (Cochran 1977). Using stratification, hunters were placed into similar groups (strata) based on their age, licenses purchased, whether they had registered with the HIP, and whether they had voluntarily

reported their hunting activity on the Internet. The first stratum consisted of people at least 16 years old that had purchased a waterfowl hunting license. The second stratum consisted of people 10-15 years old during September 1, 2008, and February 1, 2009, that had registered with the HIP by February 1, 2009. The third stratum consisted of hunters that had voluntarily reported their waterfowl hunting activity on the Internet before the sample for the mail survey was selected. The overall sample consisted of 4,818 people from the first stratum (N=56,266), 1,166 people from the second stratum (N=13,419), and 1,672 from the third stratum (N=1,672). Estimates were derived for each group separately. The statewide estimate was then derived by combining group estimates so the influence of each group matched the proportion its members occurred in the statewide population of hunters. The primary reason for using a stratified sampling design was to produce more precise estimates. Improved precision means similar estimates should be obtained if this survey were to be repeated.

Estimates were derived separately for the Upper Peninsula (UP), Northern Lower Peninsula (NLP), and Southern Lower Peninsula (SLP, Figure 1). These areas are consistent with areas used for estimation in previous years, although they do not match formal management zones. Estimates were also calculated separately for waterfowl management zones. Hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest. Estimates were calculated along with their 95% confidence limit (CL). In theory, this confidence limit can be added and subtracted from the estimate to calculate the 95% confidence interval. The confidence interval is a measure of the precision associated with the estimate and implies the true value would be within this interval 95 times out of 100. Unfortunately, there are several other possible sources of error in surveys that are probably more serious than theoretical calculations of sampling error. They include failure of participants to provide answers (nonresponse bias), question wording, and question order. It is difficult to measure these biases. Thus, estimates were not adjusted for possible bias.

Statistical tests are used routinely to determine the likelihood that differences among estimates are larger than expected by chance alone. The overlap of 95% confidence intervals was used to determine whether estimates differed. Non-overlapping 95% confidence intervals was equivalent to stating the difference between the means was larger than would be expected 995 out of 1,000 times ($P < 0.005$), if the study had been repeated (Payton et al. 2003).

Questionnaires were mailed initially in mid-March. Up to two follow-up questionnaires were sent to non-respondents. Questionnaires were undeliverable to 120 people, primarily because of changes in residence. Questionnaires were returned by 3,424 people, yielding a 58% adjusted response rate. In addition, 1,672 people voluntarily reported information about their hunting activity via the internet before the random sample was selected.

RESULTS

License sales and hunter participation

In 2008, 58,036 people purchased a Michigan waterfowl hunting license (Table 2). The average age of people that purchased a waterfowl hunting license was 42 years (Figure 2). About 2% (899) of waterfowl license buyers were younger than 17 years old. Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license; thus, the count of youth license buyers failed to include all youth waterfowl hunters. About 98% of the waterfowl hunting license buyers were males.

An estimated 47,384 people went afield to hunt waterfowl in 2008 (Table 3). The mean age of the active waterfowl hunter was 41 years, and about 10% of the active hunters were less than 17 years old (4,819 youth hunters). About $66 \pm 1\%$ of the people eligible to hunt waterfowl spent time hunting ducks or geese. About $73 \pm 1\%$ of the people that had purchased a waterfowl hunting license (stratum 1) hunted waterfowl. In contrast, $37 \pm 2\%$ of the people less than 16 years old that had registered with the HIP (stratum 2) hunted waterfowl. An estimated 40,405 duck hunters spent 308,939 days afield; while an estimated 34,292 goose hunters spent 259,620 days afield (Tables 4 and 5). About $38 \pm 2\%$ ($27,313 \pm 1,083$) of those eligible to hunt waterfowl attempted hunting both ducks and geese.

An estimated $2,755 \pm 434$ youth hunters (10-15 years old) participated during the 2-day youth waterfowl hunting season. About $21 \pm 3\%$ of the youth hunters eligible to hunt during the youth season actually participated. An estimated $14 \pm 1\%$ of adult (at least 18 years old) waterfowl hunters in 2010 ($5,979 \pm 613$) accompanied at least one youth during the 2-day youth waterfowl hunting season. (More than one adult could report hunting with the same youth; thus, the estimated number of adults hunting with a youth was greater than the number of youth hunting during the youth season.)

Harvest and hunting trends

The number of active duck hunters statewide (all seasons combined), hunting effort, and harvest did not change significantly between 2007 and 2008 (Tables 4-7). The number of goose hunters, their hunting effort, and harvest also did not change significantly statewide (all seasons combined) between 2007 and 2008 (Tables 4-6 and 8).

Hunter opinions

An estimated 57% of the Michigan duck hunters were satisfied with their duck hunting experience in 2008, 21% had a neutral opinion about their experience, while 20% of duck hunters were dissatisfied (Table 9). Satisfaction among goose hunters with their goose hunting experience was similar to the satisfaction levels reported for duck hunting.

Nearly 50% of Michigan duck hunters were satisfied with the 2008 duck hunting season dates, length of the duck season, and the daily duck limit (Table 9). About 42% of the duck hunters reported they were satisfied with the number of ducks seen in 2008, but only 28% of duck hunters were satisfied with the number of ducks harvested. Similarly, about 60% of

goose hunters were satisfied with the number of geese seen in 2008, but only 34% of goose hunters were satisfied with the number of geese harvested.

Most ($64 \pm 2\%$) duck hunters preferred to hunt in the South Zone, while $22 \pm 2\%$ of duck hunters preferred to hunt in the Middle Zone and $12 \pm 1\%$ preferred to hunt in the North Zone. About $2 \pm 1\%$ of the duck hunters did not indicate a preferred hunt zone. Among hunters that preferred to hunt in the South Zone, nearly equal proportions preferred to begin the 2009 duck hunting season on September 26, October 3, or October 10 (Table 10). Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2009 duck hunting season on September 26 or October 3. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the 2009 duck hunting season was September 26.

An estimated $38 \pm 2\%$ of duck hunters ($15,356 \pm 922$) hunted diving ducks in Michigan. Among these hunters that sought diving ducks, $9,822 \pm 776$ hunters hunted 1-4 days, $3,759 \pm 501$ hunted 5-10 days, and $1,775 \pm 349$ hunted 10 or more days. Among these hunters that sought diving ducks, nearly equal proportions preferred having a 60-day season with varied daily bag limits for scaup ($34 \pm 3\%$) as hunters that preferred a 45-day season with a constant 2-bird daily bag limit ($39 \pm 3\%$). However, $27 \pm 3\%$ of hunters did not report a preference between these two options.

Most duck hunters reported the closed canvasback season and the restricted daily bag limits for scaup did not affect how frequently they hunted ducks (63%) and did not affect their hunting satisfaction (54%, Table 11). Although most hunters were unaffected by these regulations, more hunters reported that these restrictions decreased their hunting effort (23%) and satisfaction (34%) than hunters reporting increased effort (2%) and hunt satisfaction (2%).

Among active duck and goose hunters, there were no dates for the 2-day youth waterfowl hunting season in 2009 that was favored by most hunters. An estimated $38 \pm 2\%$ of hunters reported they were undecided about the preferred dates. In contrast, $19 \pm 2\%$ of hunters preferred the youth season be held during September 12-13 and $28 \pm 2\%$ preferred a September 19-20 season. An addition $17 \pm 2\%$ of hunters did not provide an answer or selected other dates for the youth season.

DISCUSSION

Raftovich et al. (2010) reported estimates of harvest, hunter numbers, and hunting effort of Michigan waterfowl hunters in 2008 from a USFWS survey. These estimates were based on responses received from a random sample of HIP registrants. Estimates from the current survey and the USFWS survey were generally not significantly different, except for estimates of hunting effort among duck hunters (Table 12). This difference may reflect unknown differences in the way the surveys were implemented.

Wright (1978) and Frawley (2012) compared estimates of waterfowl hunting activity and harvest of waterfowl hunters derived from mail surveys to information reported at mandatory check stations. Estimates of waterfowl harvest were overestimated by 100-135%, and the

number of hunting trips was overestimated by 35-73%. Wright attributed the largest source of bias associated with the harvest estimate to hunters reporting the take of hunting partners, rather than only reporting their harvest.

Since 1954, the highest numbers of duck and goose hunters recorded in Michigan occurred in 1970 (Figure 3). From this peak, the current number of people hunting ducks has declined 71% (average annual decline = 3.2%), while the number of people hunting geese has declined 47% (average annual decline = 1.7%). Declining numbers of small game hunters, including waterfowl hunters, has been noted previously in Michigan and throughout the United States since the mid-1970s (Enck et al. 2000, U.S. Department of the Interior 2002, Aiken 2004, Frawley 2006). Between 2001 and 2006, the number of hunters pursuing ducks declined 28% nationally (U.S. Fish and Wildlife Service 2010). Similarly, the number of people hunting ducks in the regular duck hunting season (first season split) declined an estimated 27% in Michigan during this same period (Figure 3). Many factors are responsible for declining waterfowl hunter numbers including increased urbanization of the human population, increased competition between hunting and other recreational activities, decreased access to private land for hunting, and loss of waterfowl habitat. Although the number of duck hunters and duck harvest has decreased since 1970, duck harvest per day of hunting effort has increased (Figure 4). Goose harvest and the mean number of geese taken per day of hunting effort also have increased gradually since the 1970s (Figure 4).

The proportion of duck hunters satisfied with their overall duck hunting experience was the same in both 2007 and 2008 (57% satisfied both years, Table 9). Moreover, similar proportions of duck hunters were satisfied with the number of ducks seen, ducks harvested, and hunting season dates in both 2007 and 2008. Goose hunters also reported similar levels of satisfaction with their overall goose hunting experience in 2007 and 2008 (54% satisfied both years, Table 9). Furthermore, goose hunters in 2007 and 2008 reported similar levels of satisfaction with the number of geese seen and geese harvested.

ACKNOWLEDGEMENTS

I thank all the hunters that provided information. Autumn Feldpausch, Jamie Fuller, Anna Mitterling, Theresa Riebow, Alice Stimpson, and Becky Walker completed data entry. Marshall Strong created Figure 1. Supriya Reddy and Chris Larson developed the internet harvest reporting application. Russ Mason, Cheryl Nelson, Doug Reeves, and Mark Sargent reviewed a draft version of this report.

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Table 1. Waterfowl hunting seasons in Michigan, 2008-2009.

Species, season, and area ^a	Season dates
Ducks ^b	
North Zone (UP)	Oct. 4 – Dec. 2
Middle Zone	Oct. 4 – Nov. 30 and Dec. 6 – 7
South Zone	Oct. 11 – Dec. 7 and Jan. 3 – 4
Canada geese ^{b,c}	
Early seasons	
North Zone (UP)	Sept. 1 – 10
Middle and South zones (LP)	Sept. 1 – 15
Regular seasons	
North Zone (UP)	Sept. 22 – Nov. 5
Middle Zone	Oct. 4 – Nov. 10 and Nov. 27 – Dec. 3
South Zone	Oct. 11 – 13 and Nov. 27 – Dec. 7
Late season	
South Zone	Jan. 3 – Feb. 1

^aSee Figure 1 for boundaries of hunt areas.

^bDucks and geese could also be taken during a special 2-day Youth Season (September 20-21).

^cSpecial goose hunting seasons also occurred on Goose Management Units, but these seasons affected a relatively small area.

Table 2. Number of waterfowl hunting licenses sold in Michigan, 2004-2008.

Item	Year					2007-2008 % Change
	2004	2005	2006	2007	2008	
Number of licenses sold ^a	63,320	60,234	60,994	59,475	58,526	-1.6
Number of people buying a hunting license ^{b,c}	62,738	59,658	60,401	58,863	58,036	-1.4

^aThe number of licenses sold is higher than the number of people buying licenses because some people purchased multiple licenses.

^bA person was counted only once, regardless of how many licenses they purchased.

^cHunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

Table 3. Estimated number, sex, and age of active waterfowl hunters, and proportion and number of youth waterfowl hunters in Michigan, 2004-2008.^a

Hunters	2004	2005	2006	2007	2008	
					Estimate	95% CL
Waterfowl ^b	58,422	50,431	50,230	47,748	47,384	1,035
Males (%)	98.2	97.2	97.1	95.7	94.2*	0.7
Females (%)	1.8	2.8	2.9	3.9	3.0	0.7
Age (Years)	39.6	40.4	40.4	40.2	41.4	0.6
Youth (%) ^c	NA ^d	10.7	10.9	11.2	10.2	1.0
Youth (No.) ^c	NA	5,389	5,471	5,331	4,819	534

^aAnalyses included only those people that hunted.

^bPeople that hunted ducks or geese (active hunters).

^cHunters 10-16 years of age.

^dNot available.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2007 and 2008 (P<0.005).

Table 4. Estimated number of waterfowl hunters by season and region in Michigan, 2005-2008.^a

Species and area (stratum)	2005	2006	2007	2008		2007-2008 % Change
				No.	95% CL	
Ducks (First split)						
UP	6,654	5,555	5,698	5,897	605	3
NLP	16,218	18,351	16,319	16,892	943	4
SLP	22,704	22,761	21,073	21,809	1,020	3
Statewide	40,525	41,102	38,142	39,764	1,099	4
Ducks (Second split)						
UP						
NLP	6,399	2,838	1,855	1,934	360	4
SLP	9,628	9,147	7,844	6,471	629	-18*
Statewide	15,421	11,886	9,514	8,285	718	-13
Ducks (Seasons combined)						
UP	6,696	5,578	5,703	5,903	605	4
NLP	17,883	18,634	16,689	17,100	946	2
SLP	24,218	23,915	22,331	22,704	1,031	2
Statewide	42,660	42,068	39,299	40,405	1,098	3
Geese (Early season)						
UP	2,013	1,663	2,120	1,592	325	-25
NLP	7,875	8,015	6,771	6,953	656	3
SLP	13,603	13,800	12,801	12,345	834	-4
Statewide	22,944	22,747	21,093	20,084	1,012	-5
Geese (Regular season)						
UP	3,643	3,075	3,659	3,145	451	-14
NLP	9,448	10,022	9,388	9,716	755	3
SLP	13,223	15,015	13,637	14,871	892	9
Statewide	25,207	26,934	25,650	26,300	1,070	3
Geese (Late season)						
UP						
NLP	1,057	950	569	445	174	-22
SLP	8,313	9,813	7,597	6,071	614	-20*
Statewide	9,192	10,723	8,166	6,497	646	-20*
Geese (Seasons combined)						
UP	4,334	3,611	4,415	3,716	488	-16
NLP	12,809	13,456	11,738	12,123	829	3
SLP	20,395	22,210	20,835	21,122	1,007	1
Statewide	34,726	36,570	34,445	34,292	1,108	0

^aThe number of hunters does not add up to the statewide total because hunters can hunt in more than one region. Regions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2007 and 2008 ($P < 0.005$).

Table 5. Estimated amount of waterfowl hunter effort (days afield) by season and region, 2005-2008.^a

Species and area (stratum)	2005	2006	2007	2008		2007- 2008 % Change
				No.	95% CL	
Ducks (First split)						
UP	46,678	32,366	37,279	34,630	5,193	-7
NLP	84,778	122,187	105,988	113,509	10,294	7
SLP	161,176	167,286	151,414	148,105	11,254	-2
Statewide	292,632	321,838	294,681	296,244	15,294	1
Ducks (Second split)						
UP						
NLP	30,417	5,841	3,129	2,920	619	-7
SLP	16,693	18,459	11,888	9,775	1,045	-18
Statewide	47,110	24,299	15,018	12,695	1,217	-15
Ducks (Seasons combined)						
UP	46,809	32,951	37,279	34,634	5,193	-7
NLP	114,904	128,839	109,117	116,434	10,523	7
SLP	178,029	184,347	163,302	157,870	11,769	-3
Statewide	339,741	346,137	309,699	308,939	15,773	0
Geese (Early season)						
UP	6,548	5,471	7,988	5,742	1,425	-28
NLP	30,532	31,725	29,809	25,793	3,328	-13
SLP	55,699	54,256	50,956	45,194	4,101	-11
Statewide	92,779	91,453	88,753	76,729	5,377	-14*
Geese (Regular season)						
UP	21,676	16,676	27,795	18,795	3,953	-32
NLP	45,223	55,009	49,547	58,468	6,613	18
SLP	59,751	75,221	66,334	82,754	7,854	25*
Statewide	126,650	146,907	143,677	160,017	10,765	11
Geese (Late season)						
UP						
NLP	3,012	3,304	1,894	1,030	591	-46
SLP	33,497	38,544	29,271	21,844	3,465	-25*
Statewide	36,509	41,847	31,166	22,875	3,548	-27*
Geese (Seasons combined)						
UP	28,187	22,169	35,890	24,488	4,922	-32
NLP	78,818	90,171	81,457	85,197	8,747	5
SLP	148,934	167,866	146,248	149,936	12,238	3
Statewide	255,938	280,207	263,595	259,620	15,336	-2

^aRegions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2007 and 2008 (P<0.005).

Table 6. Estimated waterfowl harvest by season and region in Michigan, 2005-2008.^a

Species and area (stratum)	2005	2006	2007	2008		2007- 2008 % Change
				No.	95% CL	
Ducks (First split)						
UP	40,274	38,194	46,586	37,290	6,825	-20
NLP	109,941	168,993	140,932	132,361	15,093	-6
SLP	178,186	183,215	162,350	173,402	18,449	7
Statewide	328,401	390,401	349,868	343,052	25,509	-2
Ducks (Second split)						
UP						
NLP	30,569	7,978	4,686	4,289	1,237	-8
SLP	25,848	22,491	19,508	16,263	2,546	-17
Statewide	56,417	30,468	24,195	20,553	2,860	-15
Ducks (Seasons combined)						
UP	40,321	38,425	46,591	37,295	6,825	-20
NLP	140,431	177,375	145,626	136,659	15,498	-6
SLP	204,067	205,069	181,846	189,650	19,834	4
Statewide	384,819	420,869	374,062	363,605	26,800	-3
Geese (Early season)						
UP	4,817	3,426	7,879	4,338	1,374	-45
NLP	32,138	30,707	26,402	27,357	5,079	4
SLP	54,435	52,539	46,499	49,271	6,630	6
Statewide	91,390	86,672	80,780	80,966	8,715	0
Geese (Regular season)						
UP	10,178	7,336	16,408	8,035	2,056	-51*
NLP	27,524	32,717	25,636	32,154	5,226	25
SLP	40,177	40,830	39,667	48,464	7,420	22
Statewide	77,880	80,883	81,712	88,652	9,427	8
Geese (Late season)						
UP						
NLP	2,170	1,909	1,133	673	515	-41
SLP	22,395	23,049	19,179	13,766	3,448	-28
Statewide	24,566	24,957	20,312	14,439	3,519	-29
Geese (Seasons combined)						
UP	14,893	10,743	24,254	12,345	2,931	-49*
NLP	61,827	65,314	53,169	60,075	8,864	13
SLP	117,115	116,456	105,380	111,638	14,115	6
Statewide	193,836	192,513	182,804	184,058	17,296	1

^aRegions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2007 and 2008 (P<0.005).

Table 7. Estimated number of duck hunters, hunting effort, and ducks harvested, summarized by season and management zone in Michigan, 2008.

Season and waterfowl zone ^a	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
First split						
North	5,857	610	34,431	5,218	37,128	6,854
Middle	10,215	782	57,122	7,493	62,066	9,928
South	28,419	1,094	204,690	13,261	243,858	22,860
Statewide	39,764	1,099	296,244	15,294	343,052	25,509
Second split						
North						
Middle	1,250	294	1,974	521	2,857	1,034
South	7,119*	668	10,721*	1,104	17,696	2,683
Statewide	8,285	718	12,695	1,217	20,553	2,860
Seasons combined						
North	5,869	610	34,433	5,218	37,119	6,854
Middle	10,340	785	59,097	7,736	64,920	10,424
South	29,254	1,100	215,409	13,748	261,566	24,121
Statewide	40,405	1,098	308,939	15,773	363,605	26,800

^aEstimates for the zones do not equal estimates for the areas in Tables 4-6 because hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest.

*Non-overlapping 95% confidence intervals indicated estimates declined significantly between 2007 and 2008 (P<0.005).

Table 8. Estimated number of goose hunters, hunting effort, and geese harvested, summarized by season and management zone in Michigan, 2008.

Season and waterfowl zone ^a	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
Early						
North	1,746	325	6,284	1,425	4,826*	1,374
Middle	3,329	444	11,754	2,045	13,012	3,035
South	15,626	885	58,691	4,631	63,129	7,387
Statewide	20,084	1,012	76,729*	5,377	80,966	8,715
Regular						
North	3,497	451	20,439*	3,953	8,877*	2,056
Middle	4,683	518	25,863	4,125	16,764	3,952
South	19,465	947	113,715*	8,843	63,011	7,597
Statewide	26,300	1,070	160,017	10,765	88,652	9,427
Late						
North	0	0	0	0	0	0
Middle	0	0	0	0	0	0
South	6,497*	624	22,875*	3,494	14,439	3,462
Statewide	6,497*	646	22,875*	3,548	14,439	3,519

^aEstimates for the zones do not equal estimates for the areas in Tables 4-6 because hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest.

*Non-overlapping 95% confidence intervals indicated estimates declined significantly between 2007 and 2008 (P<0.005).

Table 9. Level of satisfaction among waterfowl hunters with the 2007 and 2008 waterfowl hunting seasons and hunting regulations in Michigan (summarized as the proportion of active waterfowl hunters reporting various levels of satisfaction).^a

Hunting experience or regulation	Level of satisfaction and year											
	Very satisfied or somewhat satisfied			Neutral			Somewhat dissatisfied or strongly dissatisfied			No answer		
	2007		2008	2007		2008	2007		2008	2007		2008
			95%			95%			95%			95%
	%	%	CL	%	%	CL	%	%	CL	%	%	CL
Ducks seen	46	42	2	19	18	2	34	38*	2	1	1	0
Ducks harvested	30	28	2	22	22	2	42	45	2	5	5	1
Duck hunting experience	57	57	2	21	21	2	20	20	2	2	2	1
Duck season dates	46	48	2	28	29	2	23	20	2	4	2	1
Length of duck season	52	54	2	27	26	2	17	18	2	3	2	1
Daily duck limit	58	58	2	28	28	2	11	12	1	3	2	1
Geese seen	61	60	2	15	15	2	21	23	2	3	2	1
Geese harvested	36	34	2	19	20	2	38	40	2	7	5	1
Goose hunting experience	54	54	2	21	22	2	22	23	2	3*	1	1

^aEstimates associated with duck hunting were derived from answers provided by people that had hunted ducks, while estimates associated with goose hunting were derived from answers received from people that had hunted geese.

*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2007 and 2008 ($P < 0.005$).

Table 10. Preferred opening date among active duck hunters in their preferred duck hunt zone.

Date	Preferred hunt zone											
	North Zone				Middle Zone				South Zone			
	%	95% CL	No.	95% CL	%	95% CL	No.	95% CL	%	95% CL	No.	95% CL
Sep. 26	45	6	2,186	389	29	4	2,600	425	21	2	5,545	608
Oct. 3	35	6	1,712	343	31	4	2,770	435	24	2	6,296	639
Oct. 10	6	3	289	143	19	4	1,674	341	23	2	6,073	626
Oct. 17	4	2	183	113	7	2	638	212	15	2	3,825	500
Undecided	7	3	350	155	11	3	937	259	12	2	3,067	462
Other	<1	1	24	38	1	1	120	92	3	1	830	241
No answer	2	2	118	92	1	1	122	95	1	<1	224	129

Table 11. Proportion of duck hunters that reported increased or decreased hunting efforts or hunt satisfaction because of the closed canvasback season and restricted daily bag limit for scaup.

Measure	Increased		No effect		Decreased		Undecided		No answer	
	%	95% CL	%	95% CL	%	95% CL	%	95% CL	%	95% CL
Hunting effort	2	1	63	3	23	3	11	2	1	1
Satisfaction	2	1	54	3	34	3	10	2	0	0

Table 12. Comparison of estimates of waterfowl hunter numbers, hunting effort, and harvest in Michigan during 2008 from the USFWS harvest survey and the Michigan waterfowl harvest survey.

Estimate	USFWS survey ^a		Michigan survey		Difference (%)
	No.	95% CL	No.	95% CL	
Ducks					
Hunters	38,500	3,850	40,405	1,098	5
Hunting effort	237,600	28,512	308,939	15,773	30*
Harvest	326,700	49,005	363,605	26,800	11
Geese					
Hunters	37,500	3,750	34,292	1,108	-9
Hunting effort	217,200	32,580	259,620	15,336	20
Harvest	173,700	38,214	184,058	17,296	6
Ducks and geese combined					
Hunters	46,900	4,221	47,384	1,035	1

^aRaftovich et al. 2010.

*Non-overlapping 95% confidence intervals indicated estimates from the surveys were significantly different (P<0.005).

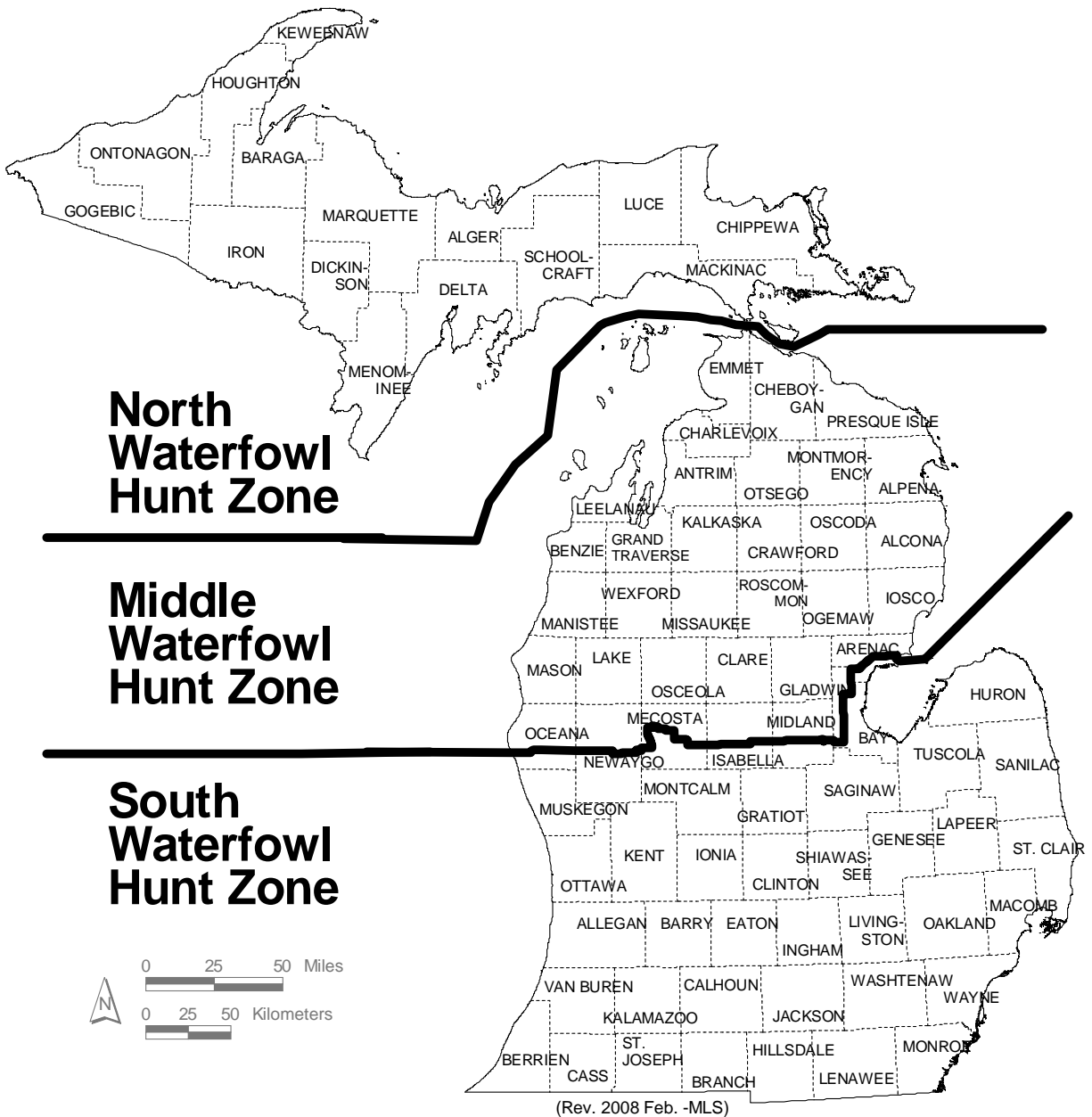


Figure 1. Areas used to summarize the waterfowl survey data for the 2008 waterfowl hunting seasons in Michigan. Regional boundaries did not match the waterfowl management hunting zones.

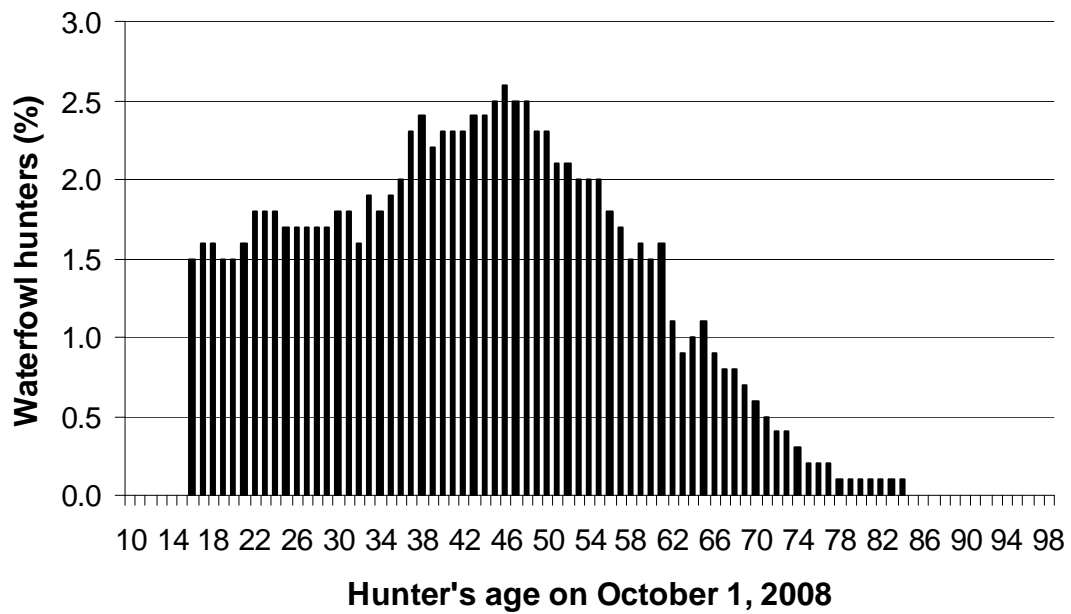


Figure 2. Age of people that purchased a waterfowl hunting license in Michigan for the 2008 hunting seasons ($\bar{x} = 42$ years). Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

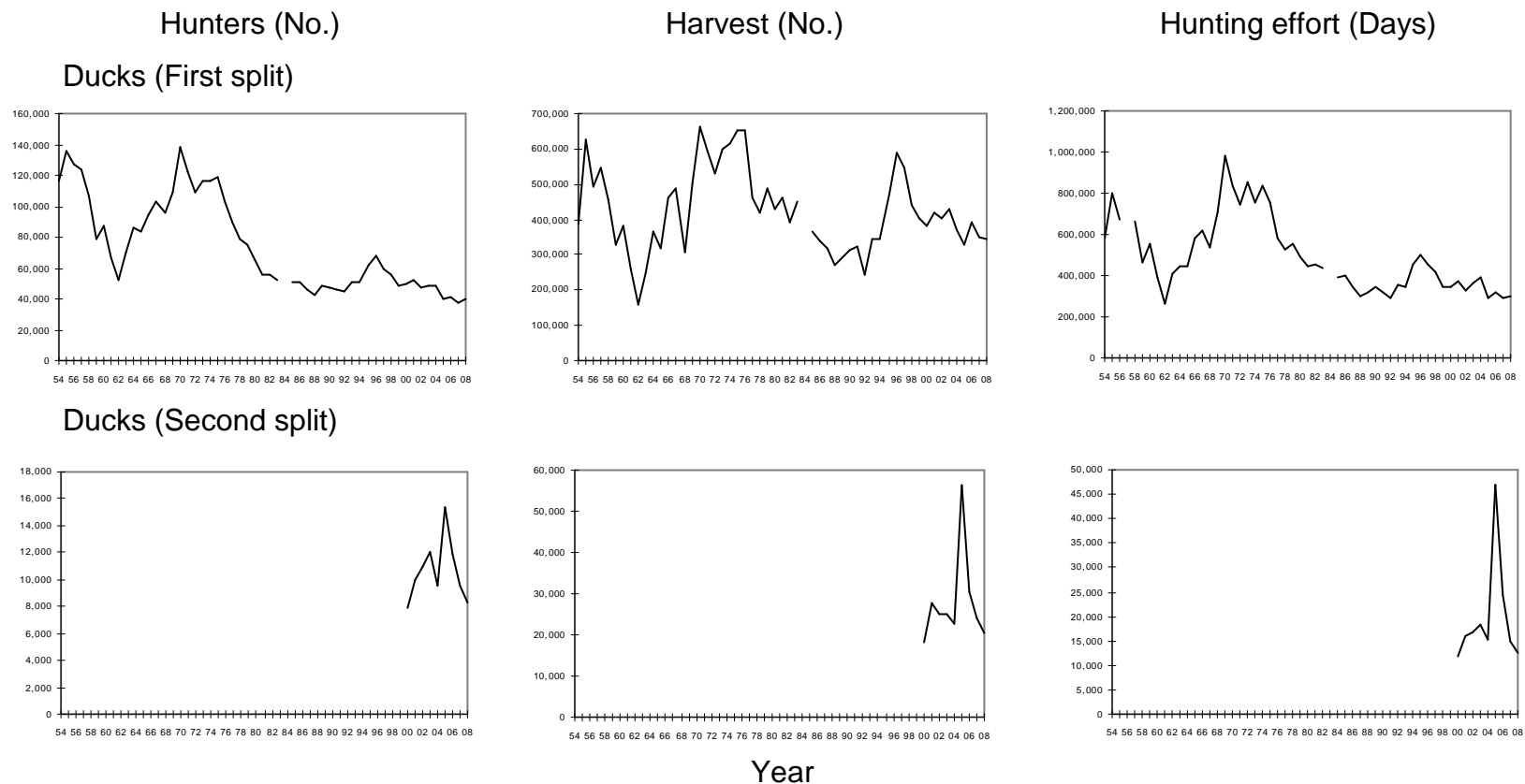


Figure 3. Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2008. No estimates were available or no seasons existed during years when no data are plotted.

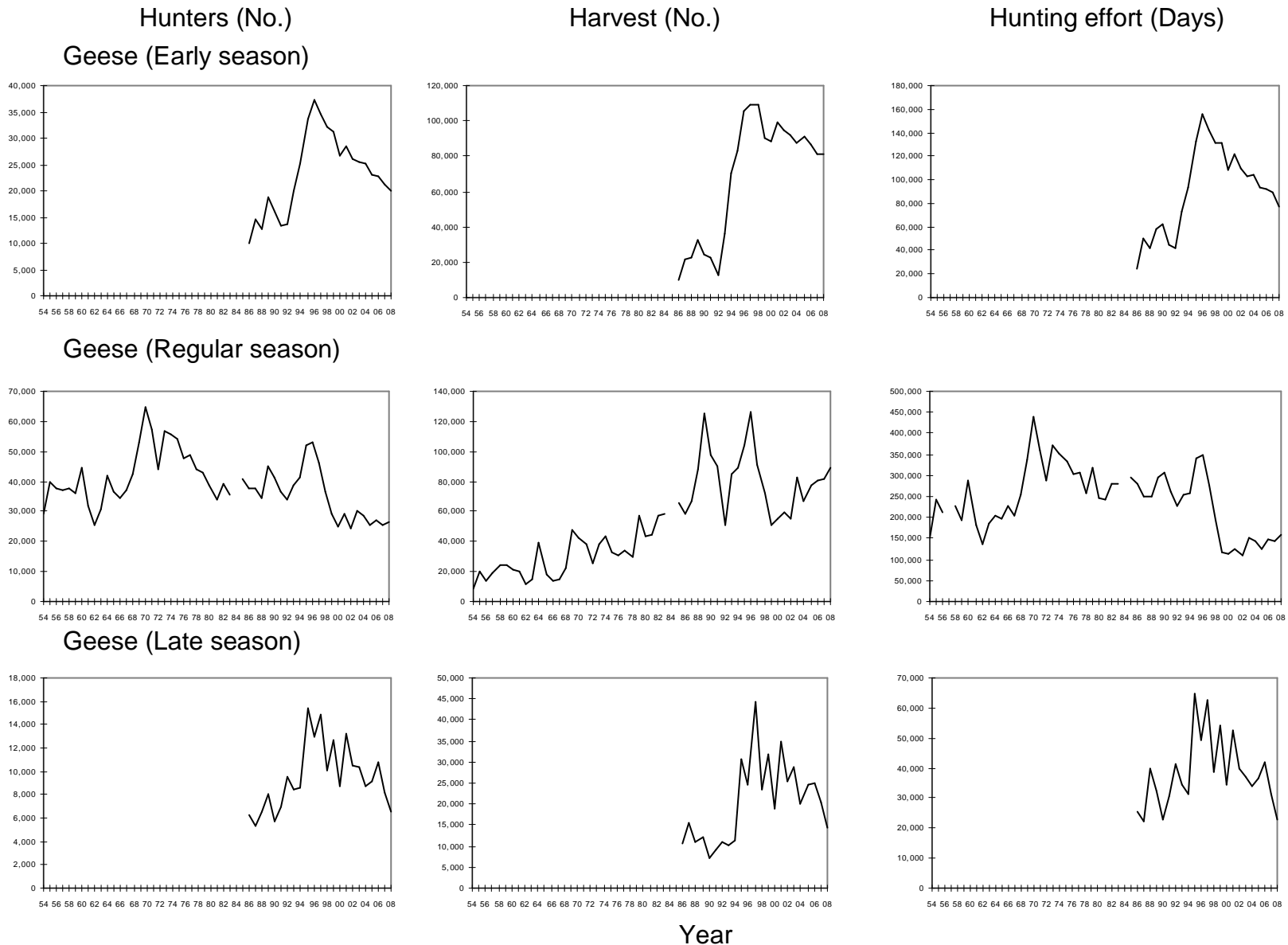


Figure 3 (continued). Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2008. No estimates were available or no seasons existed during years when no data are plotted.

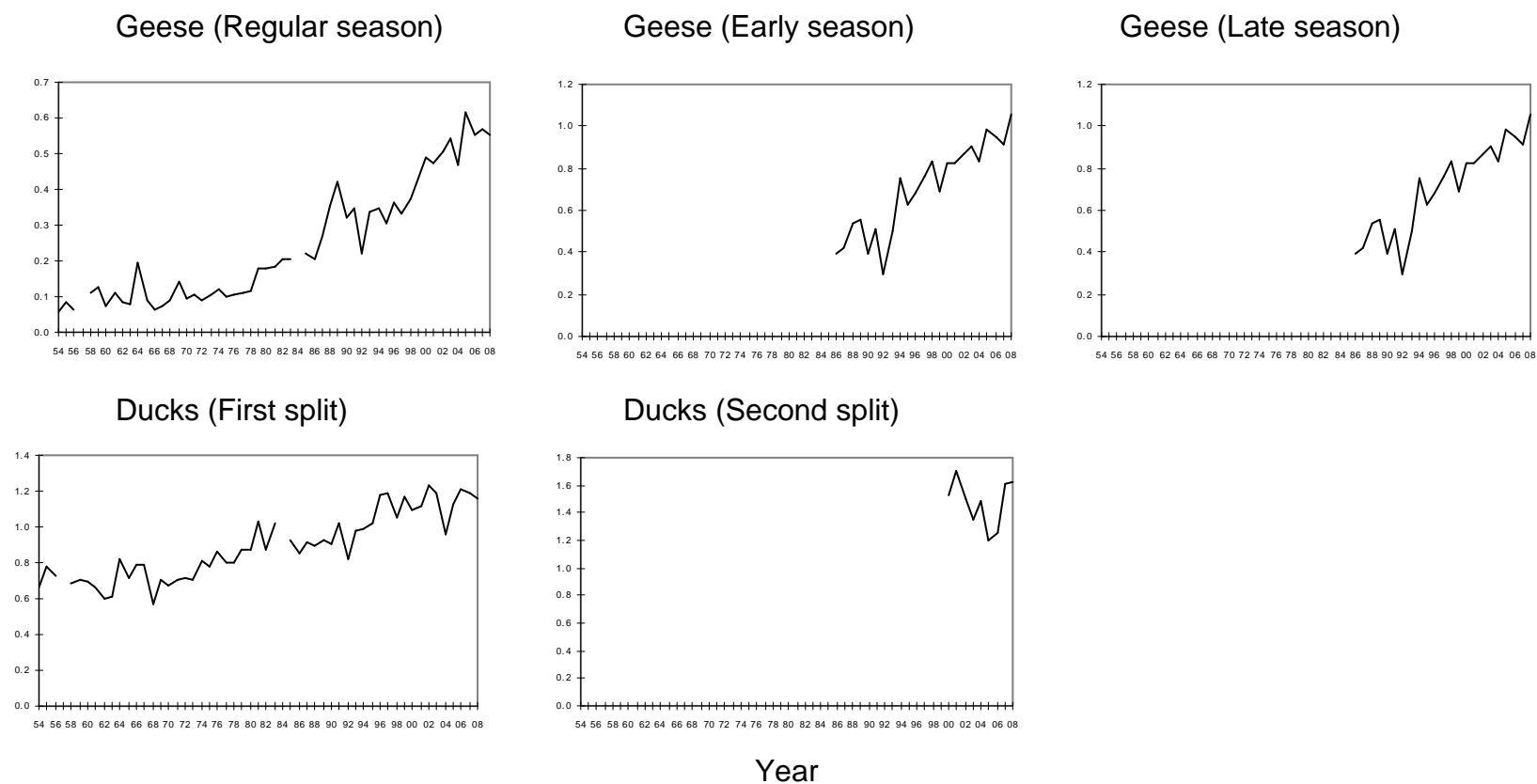


Figure 4. Estimated harvest per effort in Michigan during the waterfowl hunting seasons, 1954-2008. No estimates were available or no seasons existed during years when no data are plotted.

Appendix A

2008-2009 Waterfowl Harvest Questionnaire



It is important that you complete this questionnaire even if you did not hunt any waterfowl. Please report only your hunting activities and the birds that you harvested.

1. Did you hunt ducks or geese in Michigan from September 1, 2008, through February 1, 2009 (2008-2009 hunting season)?

- ¹ ☐ Yes. Please complete the table below and answer questions on next page.
² ☐ No. Skip all of the remaining questions and return questionnaire.

SEASON SEGMENT <i>(Check box if you hunted during the season. Note the duck season is divided into two segments and goose season divided into three segments. Dates and areas of each segment listed below.)</i>	COUNTY HUNTED <i>(For each season you hunted, list the counties hunted on separate lines.)</i>	MANAGEMENT ZONE <i>(See figure on last page for zone boundaries.)</i>			DAYS HUNTED	NUMBER OF BIRDS TAKEN	LAND TYPE		
		North (UP)	Middle (NLP)	South (SLP)			Private	Public	Both
⁰ <input checked="" type="checkbox"/> Example	1 Jackson	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>	5	12	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
¹ <input type="checkbox"/> Duck First Portion of Regular Season Oct 4 – Dec 2 (North Zone) Oct 4 – Nov. 30 (Middle Zone) Oct 11 – Dec 7 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
² <input type="checkbox"/> Duck Final Portion of Regular Season (2 days only) Dec 6-7 (Middle Zone) Jan 3-4 (South Zone)	1		2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2		2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3		2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4		2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
³ <input type="checkbox"/> Goose Early Season Sept 1-10 (North Zone) Sept 1-15 (Middle Zone) Sept 1-15 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
⁴ <input type="checkbox"/> Goose Regular Season Sept 22-Nov 5 (North Zone) Oct 4-Nov 10 & Nov 27-Dec 3 (Middle) Oct 11-Nov 13 & Nov 27-Dec 7 (South)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
⁵ <input type="checkbox"/> Goose Late Season Jan 3 – Feb 1 (South Zone)	1			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>

2. Please indicate how satisfied or dissatisfied you were with the following for the 2008-2009 waterfowl hunting season and hunting regulations: *(Select one choice per item.)*

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Strongly Dissatisfied	Not Applicable
a. Number of <u>ducks</u> you saw.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
b. Number of <u>ducks</u> you harvested.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
c. Your overall <u>duck</u> hunting experience.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
d. <u>Duck</u> season dates.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
e. The number of days in the <u>duck</u> season.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
f. The size of the daily <u>duck</u> limit.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
g. Number of <u>geese</u> you saw.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
h. Number of <u>geese</u> you harvested.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
i. Your overall <u>goose</u> hunting experience.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>

Questions continue on next page. You can report via the internet at <https://secure1.state.mi.us/wildlifesurveys/waterfowl.aspx>.

3. What is your preferred zone to hunt ducks in Michigan? (Check one choice.)
- 1

☐ North Zone
(Upper Peninsula)

2

☐ Middle Zone
(Northern Lower Peninsula)

3

☐ South Zone
(Southern Lower Peninsula)
4. For your preferred zone to hunt ducks, as in the previous question, please indicate the opening date you would prefer for that zone for the 2009-2010 duck season. (Check one.)
- 1

☐ Sept. 26

2

☐ October 3

3

☐ October 10

4

☐ October 17

5

☐ Undecided

6

☐ Other: _____
5. How many days did you specifically hunt for diving ducks (e.g., bluebills, redheads, buffleheads, goldeneye, etc.) during the 2008-2009 hunting season? (Check one.)
- 1

☐ None
- 2

☐ 1-4 days
- 3

☐ 5-10 days
- 4

☐ More than 10 days
6. The daily limit on scaup (bluebills) varied over the course of season in 2008-09 (1 to 2 birds depending on dates). Assuming the overall duck season is 60 days for species other than scaup, would you prefer a 60-day scaup season with daily limits that changed from 1 to 2 during the season or a 45-day scaup season with a 2-bird daily limit? (Check one.)
- 1

☐ 60-days with daily limits that vary from 1 to 2, depending on season dates
- 2

☐ 45-days with daily limits that remain at 2
- 3

☐ Undecided
7. During the 2008-2009 hunting season, would you say that the restrictions on diving ducks (i.e., closed canvasback season and scaup daily limit restrictions) generally increased or decreased the number of days you duck hunted? (Check one choice.)
- 1

☐ Greatly increased
- 2

☐ Increased
- 3

☐ No effect
- 4

☐ Decreased
- 5

☐ Greatly decreased
- 6

☐ Undecided
8. During the 2008-2009 hunting season, would you say that the restrictions on diving ducks (i.e., closed canvasback season and scaup daily limit restrictions) generally increased or decreased your overall level of satisfaction with the duck hunting season? (Check one.)
- 1

☐ Greatly increased
- 2

☐ Increased
- 3

☐ No effect
- 4

☐ Decreased
- 5

☐ Greatly decreased
- 6

☐ Undecided
9. If you are a youth, did you hunt during Michigan's Youth Waterfowl Hunting weekend (September 20-21, 2008)?
- 1

☐ Yes
- 2

☐ No
10. If you are an adult, how many youth did you take waterfowl hunting during Michigan's Youth Waterfowl Hunting weekend (September 20-21, 2008)?
- 0

☐ None, skip to Question No. 12
- Record the number of youth : _____
11. How many of the youth that you took hunting during Michigan's Youth Waterfowl Hunting weekend (September 20-21, 2008) were family members (for example, child, step-child, grandchild, etc.)?
- 0

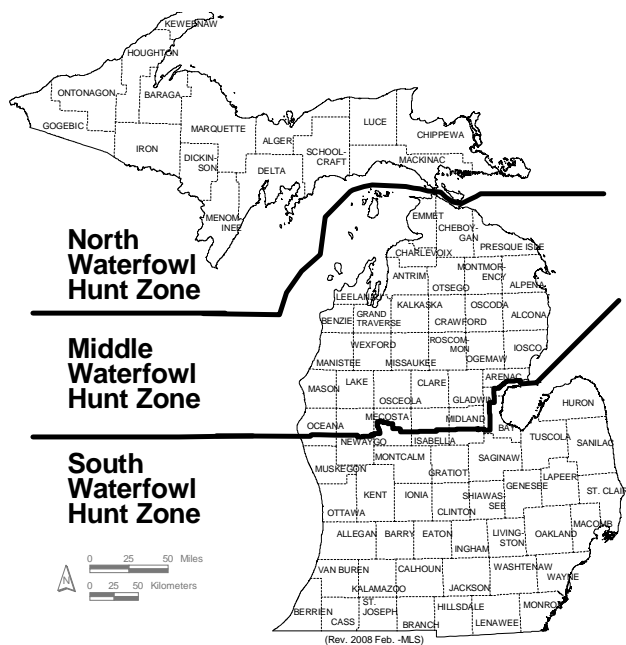
☐ None
- Record the number of youth : _____
12. What would be your preferred weekend for the Federal Youth Waterfowl Weekend hunt in 2009? (Check one choice.)
- 1

☐ Sept. 12-13
- 2

☐ Sept. 19-20
- 3

☐ Undecided
- 4

☐ Other: _____



Please return questionnaire in the enclosed postage-paid envelope.
Thanks.